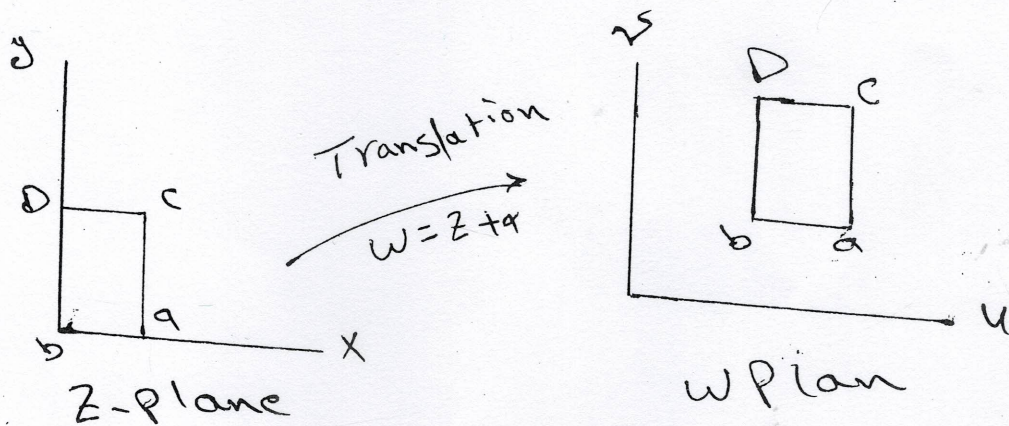


Linear Mapping

1- translation

$$[w = z + \alpha]$$

α : complex No.



EX/ what is the image of the rectangular region of the z-Plane bounded by the lines $x=0$, $y=0$, $x=1$, $y=2$ under the transformation $w = z + (2-i)$ in the w-Plane.

Sol

$$w = z + (2-i)$$

$$w = u + vi$$

$$z = x + yi$$

$$u + vi = (x + yi) + (2 - i)$$

$$u + vi = x + 2 + yi + i \Rightarrow u + vi = x + 2 + i(y+1)$$

$$u = x + 2, \quad v = (y+1)$$

$$\text{when } x=0, u=2, \quad x=1, u=3$$

$$y=0, v=1, \quad y=2, v=3$$

Ex/ what is the image of the triangular region of the z -plane bounded by the lines $x=0, y=0, x+y=1$ under the transformation $w = z + (1+i)$ in w -plane.

Sol/

$$w = z + (1+i)$$

$$u+vi = x+yi + 1+i$$

$$u+vi = x+1+i(y+1)$$

$$u = x+1, \quad v = y+1$$

when $x=0, u=1$

$y=0, v=1$

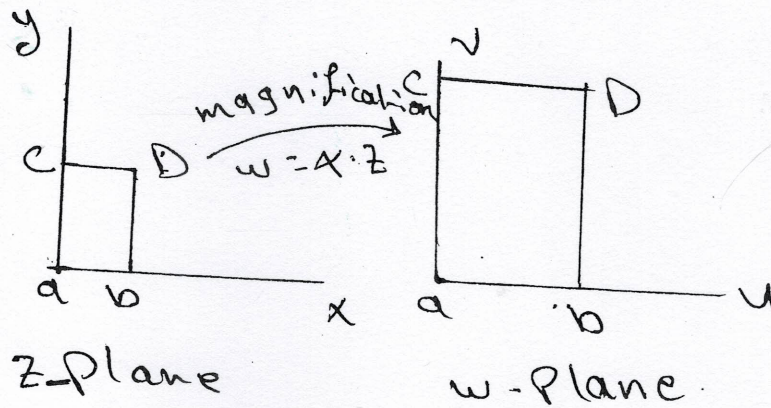
$$x+y=1 \Rightarrow x = u-1$$

$$u-1+v-1=1 \quad y = v-1$$

$$u+v=3$$

EX/ Find the image S' of the square S with vertices at $1+i, 2+i, 2+2i, 1+2i$ under the linear mapping $w = z + 2-i$.

② magnification:-



$$[w = \alpha \cdot z]$$

where α is areal No.

Ex/ what is the image of the rectangular region of the z-plane bounded $x=0, y=0, x=1, y=2$ under the transformation $w=2z$ in the w-plane.

$$w = 2z$$

$$u + vi = 2(x + yi)$$

$$u + vi = 2x + 2yi$$

$$u = 2x \quad , \quad v = 2y$$

when $x=0, u=0, x=1, u=2$

$y=0, v=0, y=2, v=4$

~~is~~

Ex / what is the image of the triangular region of the z -plane bounded by the $y=0$, $x+y=1$, $x=0$ under the transformation $w = \frac{1}{2}z$ in w -plane

Sol /

$$w = \frac{1}{2}z$$
$$u + vi = \frac{1}{2}(x + yi)$$
$$u + vi = \frac{x}{2} + \frac{yi}{2}$$
$$u = \frac{x}{2}, \quad v = \frac{y}{2}$$

when $x=0$, $u=0$
 $y=0$, $v=0$

$$x+y=1$$
$$2u+2v=1 \Rightarrow u+v = \frac{1}{2}$$

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